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(54) Bearer Rings for Rotary Printing Machines

(57) A rotary printing machine including two adjacent cylinders 1, 3 having bearer rings 25, 27 arranged at one end for rolling contact to determine the cylinder positions, each bearer ring being located on a shaft 5, 7 of the respective cylinder outside a support 11, in which the shafts are carried. If the cylinders are forced apart by blanket bulges or accumulations the bearer rings are pressed together rather than separated. Further bearer rings 31, 33 may be provided at the other ends of the cylinders, either inside or outside the shaft supports at those other ends. One of the bearer rings mounted outside a support may serve as a disc of a disc brake.

Fig.1

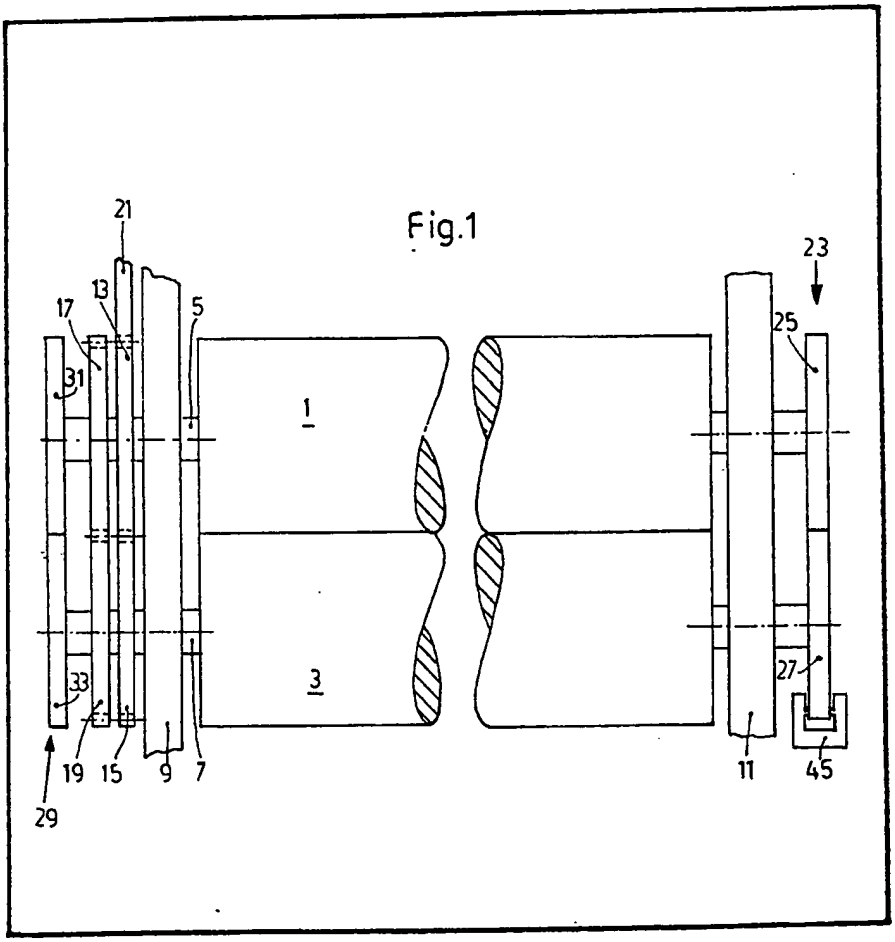

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Fig.1

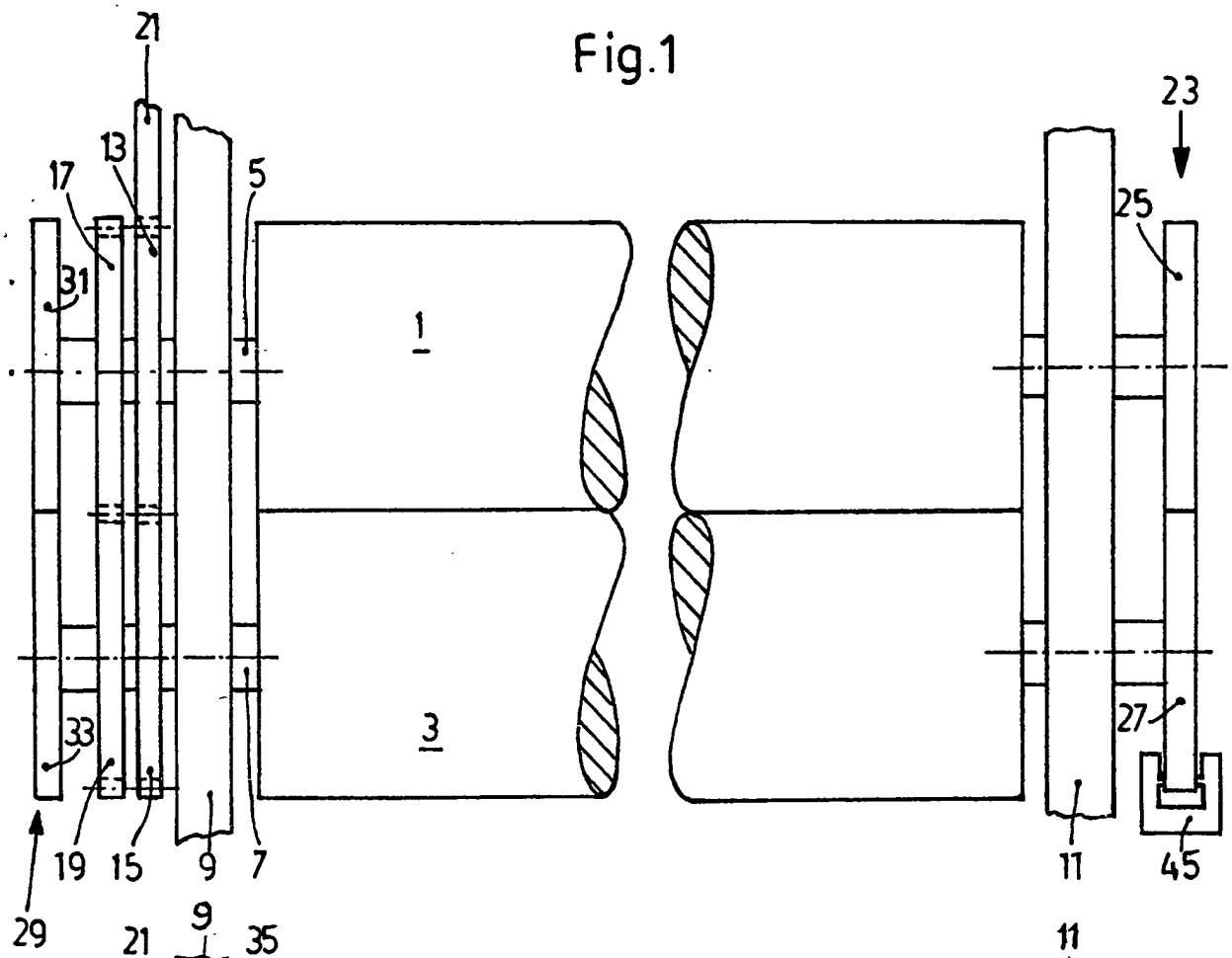
21
13
17
5
23
25
31
1
3
33
27
19
15
9
7
11
45
29

Fig.2

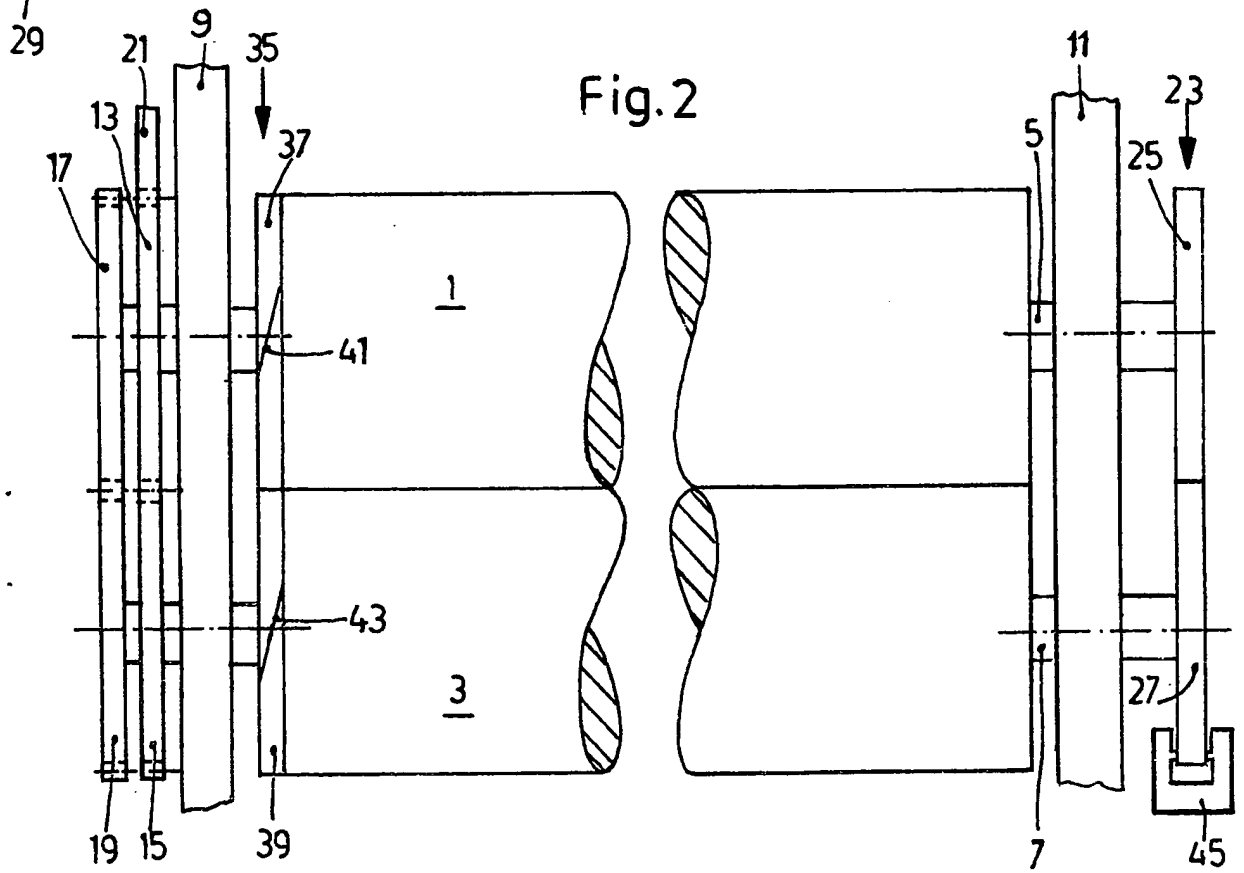
9
21
35
11
23
13
37
5
25
17
1
41
43
3
27
19
15
39
7
45

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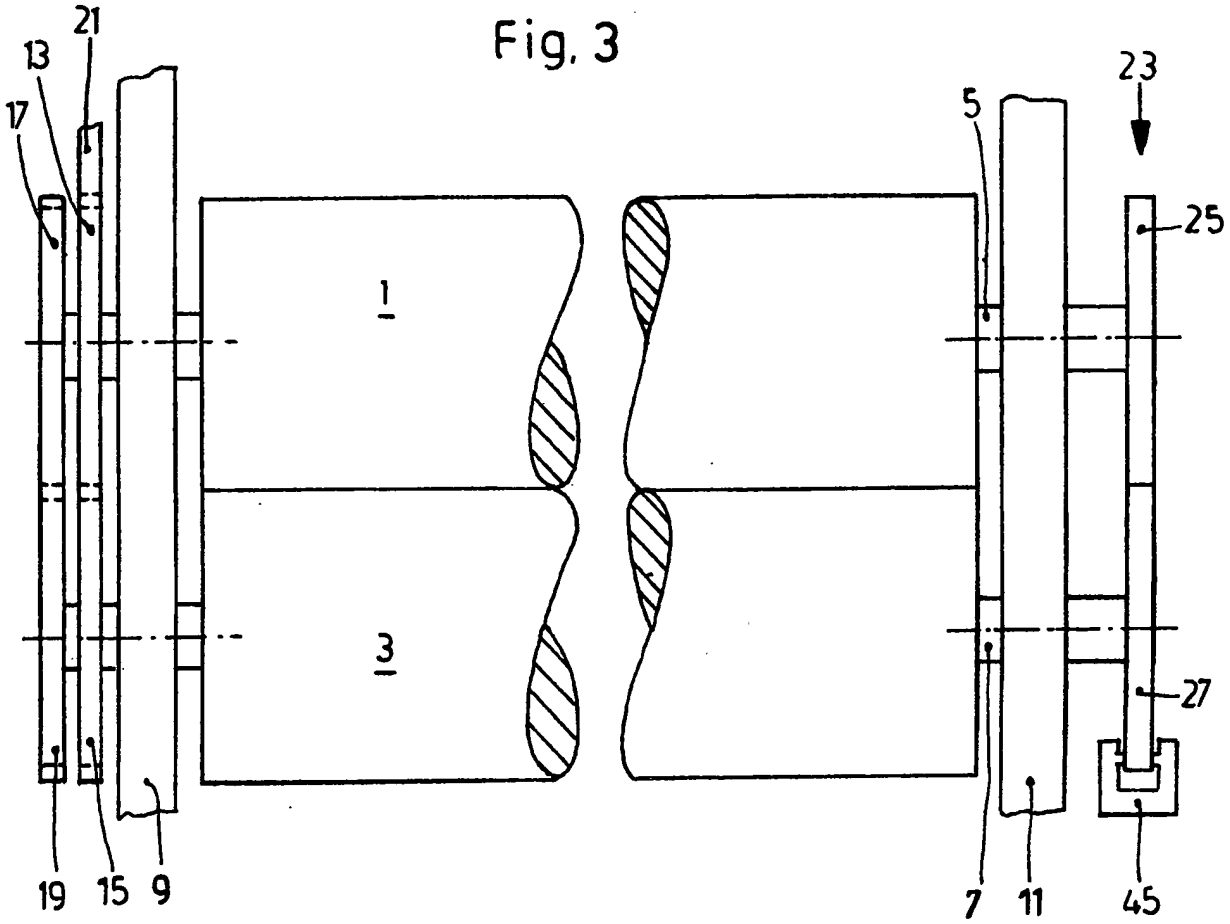
Fig. 3



SPECIFICATION

Rotary Printing Machine with Cylinders having Bearer Rings

This invention relates to a rotary printing machine including two adjacent cylinders each of which has a bearer ring carried by the shaft of the respective cylinder at one end of the cylinder; the bearer rings are arranged to rotate with the respective cylinders and to make rolling contact with one another to determine the distance between the axes of the cylinders. Such bearer rings are sometimes referred to as schmitz rings and they may be arranged to roll on one another under prestressing for constant contact.

Bearer ring arrangements of this type are well known in printing technology (Printing Machinery News 1976, Ed. 63 pp 3—24). They are used in general to guarantee an exact and smooth rolling of the individual plate-, blanket-, and impression cylinders in order to avoid the occurrence of slurring or the so-called schmitz, i.e. the defective shadowy border on the type face and image which occur with not completely satisfactory cylinder contact. These bearer ring arrangements serve in particular to prevent bending and torsional or rotational vibration of the cylinders which can lead to double print and to streaks in the printing type. Moreover the bearer rings are usually pressed together under considerable pressure in order to eliminate lifting i.e. separation, or slipping of the bearer rings during the printing.

Conventionally, bearer rings are each disposed directly on or adjacent one end of the printing unit cylinder, e.g. on the shaft of the cylinder at a location between the end of the cylinder and the support for the shaft thereof; this has the advantage that the elasticity of the oscillatory assembly formed by a cylinder and its shaft is small and its critical bending and torsional or rotational vibration fundamental frequencies are consequently high. However, this arrangement has the disadvantage, that, in the event of the occurrence of rubber blanket bulges as a result of an inaccurate machine setting or of a build up of ink and paper dust deposit which tend to push the printing unit cylinders apart, the bearer ring contact may be broken. This can lead to slight torsional or rotational vibrations which make themselves evident in the printing style owing to the extraordinarily high shock loads on the bearer rings which are caused when the bearer rings, which are momentarily lifted from each other, come together and strike each other with great force as the channels or grooves in the plate- and blanket cylinders roll over each other. These shock loads can cause very costly damage to the bearer rings.

An object of the invention is to provide a bearer ring arrangement in which printing irregularities in the printing face and impact stresses on the bearer rings are eliminated or reduced more effectively and simply and in which a lifting or separation of the bearer rings during operation is substantially prevented.

According to the present invention there is provided a rotary printing machine including two adjacent cylinders each of which has a bearer ring carried by the shaft of the respective cylinder at one end of the cylinder, the bearer rings being arranged for rolling contact with one another to determine the distance between the axes of the cylinders, each shaft at the said one end of the respective cylinder being supported by a respective shaft support at a location nearer to the adjacent end of the cylinder than is the bearer ring so that each bearer ring is disposed on the shaft at that side of the support which is remote from the cylinder.

This bearer ring arrangement has the advantage that, with a spreading or separation of the two printing unit cylinders, the two bearer rings are not separated but rather are forced together more forcibly. Thus relative slipping or separation of the bearer rings is avoided. Furthermore the initial contact pressure or prestressing of the bearer rings can be considerably reduced so that the danger of damage to the bearer rings is significantly lessened.

Advantageously, each cylinder has a further bearer ring carried by the shaft of the respective cylinder at the other end of the cylinder, the further bearer rings being arranged for rolling contact with one another, and the said further bearing rings are each disposed on the respective shaft at that side of a respective shaft support, in which the shaft at the said other end of the respective cylinder is carried, which is remote from the cylinder. Easy access from the outside to the bearer rings of both bearer ring arrangements is achieved with this construction without the need to dismantle or dismount the printing machine cylinders, should they ever need to be replaced.

Expediently, the shafts at the said other ends of the cylinders also carry respective driving wheels by which the cylinders are driven, and the further bearer rings are each disposed at that side of the respective driving wheel, which is remote from the cylinder.

According an alternative embodiment of the invention, the further bearer rings are each disposed on the respective shaft at a location between a respective shaft support, in which the shaft at the said other end of the respective cylinder is carried, and the said other end of the cylinder. Thus, on the drive side of the printing machine the bearer rings are arranged on the side of the shaft supports nearer the cylinders and the bearer rings on the other side, termed the operating side, of the printing machine are arranged on the side of the shaft supports remote from the cylinders. In many cases it is in fact sufficient to provide one bearer ring arrangement outside the cylinder shaft support and to provide the other inside the cylinder shaft support in order to prevent lifting or separation of the bearer rings in the bearer ring arrangements at both

sides. This construction requires less space and has the advantage of easier accessibility of the drive wheels.

In certain measurement proportions of the printing machine cylinders there is no danger at any time of bending vibrations occurring since the critical bending speed is far in excess of the operational speed of the printing machine. It is advantageous then, if the bearer rings are only provided on the operating side of the printing machine and the drive wheels for the cylinders form a restraint stiff against torsion or rotational movement of the shafts of the cylinders; for this, the drive wheels are adapted to engage and cooperate with one another in such a manner that rotational movement of the shaft of one cylinder without rotation of the other shaft is substantially prevented. This construction is then quite sufficient to prevent the occurrence of torsional or rotational vibrations.

According to a further feature of the invention at least one of the bearer rings of the or one of the bearer ring arrangements arranged on the side of the respective support remote from the cylinder can be made dual purpose by adapting it to serve as the friction disc of a disc brake.

The invention may be carried into practice in a number of ways but certain specific embodiments will now be described by way of example, with reference to the accompanying drawings, in which:—

Figure 1 shows two cylinders of a rotary printing machine each with a bearer ring at each end mounted outside the shaft supports,

Figure 2 shows two cylinders of a rotary printing machine each with a bearer ring at each end, at one end the bearer ring being mounted inside the shaft support and at the other end the bearer being mounted outside the shaft support, and

Figure 3 shows two cylinders of a rotary printing unit each with a bearer ring at one end only, mounted outside the shaft support.

In all the Figures like parts have where possible been given like reference numerals. Thus in all the Figures there are shown two rotary printing machine cylinders 1 and 3, the shafts 5 and 7 of which extend at both ends through the two side walls 9 and 11 of a rotary printing press, side 9 being termed the drive side as the drive gears for the cylinders are located at that side and side 11 being termed the operating side as that is the side of the machine on which the operator operates. The shafts 5 and 7 are supported at each end by shaft supports in the side walls 9 and 11. Drive gear wheels 13, 15, 17, 19 are mounted on the shafts 5 and 7 on the outside of the side wall 9, i.e. on the side of the side wall 9 remote from the cylinders 1 and 3, which drive wheels mesh together, with other cylinder wheels and with a gear wheel 21 by which all the gear wheels are driven.

On the outside of the side wall 11 the shafts 5 and 7 carry a bearer ring arrangement 23 which comprises two basically disc-shaped bearer rings 25 and 27 which rotate respectively with the printing unit cylinders 1 and 3 and roll on one another in mutual contact. By setting the shaft supports for the shafts 5 and 7 in the side walls 9 and 11 in a suitable manner, the bearer rings 25 and 27 are put into contact under mutual prestressing which prevents the bearer rings 25 and 27 from lifting off one another, i.e. becoming momentarily separated, or slipping one against the other, and thereby also prevents the occurrence of bending and torsional or rotational vibrations or oscillations.

In contrast to known bearer ring arrangements in which the bearer rings are arranged inside the side wall, i.e. between the adjacent end of the cylinder and the neighbouring side wall in which the shaft is supported, in the bearer ring arrangement 23 illustrated in each of Figures 1 to 3, if the rubber blanket bulges between the printing unit cylinders 1 and 3 as a result of incorrect cylinder packing, or if ink residues and paper dust particles deposited during lengthy operations accumulate and pass between the cylinders 1 and 3, the bearer rings 25 and 27 are in fact pressed more forcibly together; thus with these occurrences it is impossible for a lifting off and subsequent banging together of the bearer rings to occur. Given the correct choice of prestressing of the bearer rings 25 and 27, during the passage over one another of the clamping grooves or channels in the printing unit cylinders 1 and 3, no such separation of the bearer rings 25 and 27 as a result of cylinder bounce should take place which could permit the latter to slip through and allow for torsional vibration or rotational oscillation of the printing unit cylinders 1 and 3.

In the embodiment shown in Figure 1, in order to be able to eliminate bending vibrations of the printing unit cylinders 1 and 3 a further bearer ring arrangement 29 is arranged at the other end of the printing unit cylinders, on the outside of the drive side wall 9 and also on the outside of the drive wheels 13 to 19, which bearer ring arrangement comprises two further bearer rings 31 and 33 which, like the bearer rings 25 and 27 are arranged to roll on one another under prestressing. In this embodiment both bearer ring arrangements 23 and 29 are easily accessible from outside the machine side walls so that the bearer rings 25, 27 and 31, 33 can be replaced in a simple manner without the need to dismantle the machine or dismount the printing unit cylinders 1 and 3.

In the embodiment shown in Figure 1, the bearer ring arrangement 29 is placed in a relatively unfavourable position and so have to be allowed space so as not to interfere with a grease tight covering of the drive wheels 13 to 19; even so they are likely to impede access to the drive wheels 13 to 19. In the embodiment shown in Figure 2 a second bearer ring arrangement 35 is again provided at the other end of the printing cylinders from the bearer ring arrangement 23, but in this embodiment the two further bearer rings 37 and 39 are located inside the side wall 9,

i.e. between the side wall 9 and the adjacent end of the respective cylinder 1 or 3.

This is no disadvantage since a lifting off or separation of the bearer rings 25, 27 and 37, 39 is avoided by the fact that the bearer ring arrangement 23 is outside the side wall 11. Therefore, no damage to the bearer rings 37 and 39 is likely to occur which would necessitate replacement of those bearer rings, particularly since the necessary setting up and operating pressure between the bearer rings 37 and 39 for correct printing is considerably reduced by the disposition of the bearer ring arrangement 23 outside the side wall 11.

However, in order to be able to replace the bearer rings 37 and 39 without dismantling the machine or dismounting the cylinders 1 and 3, divided or split bearer rings may be used for the bearer rings 37 and 39, each ring being divided into two half annular segments by two axially inclined separating lines 41 and 43, which segments can be put around the shafts 5 and 7 even with the latter in their installed condition.

In some cases, if the geometry of the printing unit cylinders 1 and 3 is of the kind where the critical bending speeds are so much in excess of the operational speed that absolutely no noticeable bending vibrations can occur, there is no need for the second bearer ring arrangement and this can be omitted, as is shown in Figure 3. However, the drive wheels 13 to 19 must then form a restraint to resist rotational movement of one of the shafts 5 and 7 without rotation of the other to prevent torsional vibrations or rotational oscillations of the shafts 5 and 7 which otherwise occur within back lash between the gears. This can be achieved, for example, in a known manner by means of close meshing (constant contact) toothed segments of the auxiliary wheels 17, 19 which, also in a known manner, can be resiliently constructed.

Since the bearer ring arrangement 23 is positioned outside the side wall 11 and can, therefore, be easily cooled, it is possible to design at least one of the already conveniently disc-shaped bearer rings 25 and 27 as the friction disc of a disc brake and thus to employ it as a dual purpose ring. For this, a brake saddle 45 grips the bearer ring 27 along its edge, which brake saddle carries two brake shoes (not illustrated in detail). In contrast to the hitherto existing operation in which the brake of the printing press is provided on the longitudinal drive shaft for reasons of space requirements and cooling, this arrangement now proposed has the considerable advantage that the brake is placed Directly on the part to be slowed down and does not have to operate through a gearing unit. It might alternatively be possible for the brake to act on the bearer ring 29 in Figure 1.

Claims

1. A rotary printing machine including two adjacent cylinders each of which has a bearer ring carried by the shaft of the respective cylinder at one end of the cylinder, the bearer rings being arranged for rolling contact with one another to determine the distance between the axes of the cylinders, each shaft at the said one end of the respective cylinder being supported by a respective shaft support at a location nearer to the adjacent end of the cylinder than is the bearer ring so that each bearer ring is disposed on the shaft at that side of the support which is remote from the cylinder.

2. A rotary printing machine as claimed in claim 1, in which each cylinder has a further bearer ring carried by the shaft of the respective cylinder at the other end of the cylinder, the further bearer rings being arranged for rolling contact with one another.

3. A rotary printing machine as claimed in claim 2, in which the said further bearer rings are each disposed on the respective shaft at that side of a respective shaft support, in which the shaft at the said other end of the respective cylinder is carried, which is remote from the cylinder.

4. A rotary printing machine as claimed in claim 3, in which the shafts at the said other ends of the cylinders also carry respective driving wheels by which the cylinders are driven, and in which the further bearer rings are each disposed at that side of the respective driving wheel, which is remote from the cylinder.

5. A rotary printing machine as claimed in claim 2, in which the shafts at the said other ends of the cylinders also carry respective driving wheels by which the cylinders are driven, and in which the further bearer rings are each disposed on the respective shaft at a location between a respective shaft support, in which the shaft at the said other end of the respective cylinder is carried, and the said other end of the cylinder.

6. A rotary printing machine as claimed in claim 1, in which each cylinder has a driving wheel carried by the shaft of the respective cylinder at the other end of the cylinder, the driving wheels of the two cylinders being in engagement and cooperating with one another in such a manner that rotational movement of the shaft of one cylinder without rotation of the other shaft is substantially prevented.

7. A rotary printing machine as claimed in any one of claims 1 to 6, in which at least one of the bearer rings, or at least one of the said further bearer rings, disposed at that side of the respective shaft support remote from the cylinder, is adapted to serve as a friction disc of a disc brake.

8. A rotary printing machine as claimed in claim 7, in which a disc brake mechanism is provided for cooperation with the said bearer ring adapted to serve as a friction disc.

9. A rotary printing machine as claimed in any one of the preceding claims, in which each shaft support is provided in a side wall of the machine.

10. A rotary printing machine substantially as specifically described herein with reference to Figure 1 or to Figure 2 or to Figure 3 of the accompanying drawings.

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